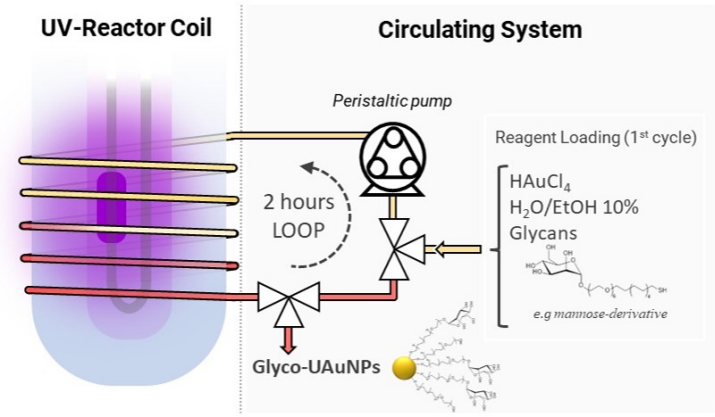
A microfluidic photo-induced platform to synthesize ultrasmall glyco gold nanoparticles

Laura POLITO [1], Patricia PEREZ SCHMIDT [1], Luigi LAY [2], Laura RAGONA [3], Katiuscia PAGANO [3], Claudio EVANGELISTI [4], Marcello MARELLI[1],

[1] National Research Council, CNR-SCITEC, Milan, Italy, [2] Department of Chemistry, Università degli Studi di Milano, Italy, [3]National Research Council, CNR-SCITEC, Milan, Italy, [4]National Research Council, CNR-ICCOM, Pisa, Italy

laura.polito@scitec.cnr.it

Ultra-small gold nanoparticles (UAuNPs) are a class of AuNPs with a diameter less than 5 nm, interesting for their peculiar physical-chemical properties which can be exploited for bio application and nanomedicine. In particular, UAuNPs are luminescent, have longer circulation time, improved biodistribution, better tissue penetration and efficient clearance pathways. UAuNPs engineered with glycans (Glyco-UAuNPs) emerged as excellent platforms for many applications since the displacement of multiple copies of glycans mimic the multivalent glycoside clusters effect which can overcome the low affinity of the individual ligands towards their receptors.[1,2] However, to fulfill the ambitious potentiality of these engineered UAuNPs, robust protocols for their synthesis, functionalization and characterization, are still needed and highly desirable. In the last years, microfluidic reactors have emerged as outstanding tools for synthesizing a wide range of NPs allowing for a fine control over particle size, morphology and reproducibility.[3,4] Herein, we show an innovative and straightforward synthesis of a library of Glyco-UAuNPs based on a reliable microfluidic approach coupled with a photo-induced reduction, that avoids the use of any further chemical reductant, templating agent or co-solvent.[5] Exploiting 1H-NMR spectroscopy, we showed that the amount of thiol-ligand exposed on the UAuNPs is linearly correlated to the ligand concentration in the initial mixture, paving the way towards the development of a programmable synthetic approach.



Synthesis of Mannose ultrasmall gold nanoparticles

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